Small Business Innovation Research/Small Business Tech Transfer

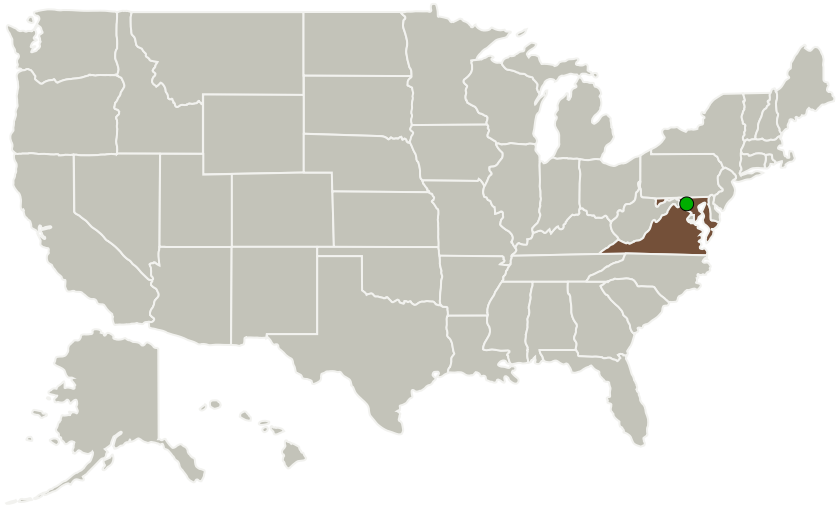
Integrated Modeling, Analysis, and Verification for Space Missions, Phase I

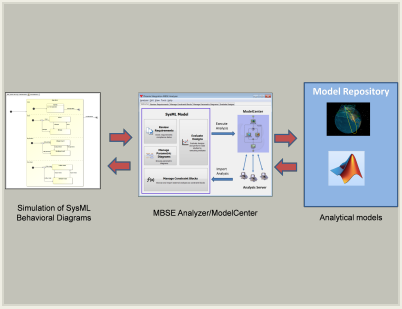
Completed Technology Project (2014 - 2014)

Project Introduction

This project will further MBSE technology in fundamental ways by strengthening the link between SysML tools and framework engineering execution environments. Phoenix Integration has produced a commercial tool (MBSE Pak) which allows engineers to link SysML diagrams (in MagicDraw and Rhapsody) to ModelCenter, a general-purpose engineering integration framework. As a result, from SysML parametric diagrams, engineers can execute actual engineering analysis tools for the purpose of systems architectural design, requirements compliance, trade studies, etc. This proposal would extend this MBSE product in several specific ways. First, it would develop a systems analysis capability for improved management decisions including the ability to perform what-if studies of technology options, simulation of schedule and cost, and probabilistic discrete event simulation for risk analysis. Second, it would improve verification and validation of models through improved requirements compliance analysis, handling of time series data, and traceability of data pedigree for modeling artifacts. Third, it would connect SysML models to executable model libraries in which components can be executed in an ad-hoc manner (on any capable computer) from the library itself and include rich support for multi-fidelity modeling tools on the backend. A representative system model would be developed as an example problem to illustrate the developed features and would be demonstrated to NASA throughout the course of the work.

Primary U.S. Work Locations and Key Partners





Integrated Modeling, Analysis, and Verification for Space Missions Project Image

Table of Contents

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Organizations Performing Work	Role	Type	Location
Phoenix Integration	Lead Organization	Industry	Blacksburg, Virginia
Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Maryland	Virginia

Project Transitions

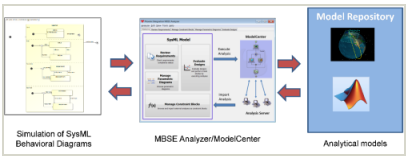
June 2014: Project Start

December 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137666)*

Images



Project Image
Integrated Modeling, Analysis, and Verification for Space Missions Project Image
(https://techport.nasa.gov/image/136585)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Phoenix Integration

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

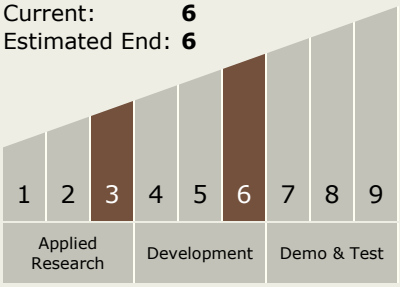
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Peter Menegay

Technology Maturity (TRL)

Start: **3**
Current: **6**
Estimated End: **6**



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Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  - TX11.3 Simulation
    - TX11.3.3 Model-Based Systems Engineering (MBSE)

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System